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|Translation|

The arts of memory
Comparative perspectives on a mental artifact

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Revised and updated by the author
Translated from the French by Matthew Carey

For linguists, anthropologists and archaeologists, the emblematic image always and everywhere preceded the appearance of the sign. This myth of a figurative language composed by icons—that form the opposite figure of writing—has deeply influenced Western tradition. In this article, I show that the logic of Native American Indian mnemonics (pictographs, *khipus*) cannot be understood from the ethnocentric question of the comparison with writing, but requires a truly comparative anthropology. Rather than trying to know if Native American techniques of memory are true scripts or mere mnemonics, we can explore the formal aspect both have in common, compare the mental processes they call for. We can ask if both systems belong to the same conceptual universe, to a mental language—to use Giambattista Vico's phrase—that would characterize the Native American arts of memory. In this perspective, techniques of memory stop being hybrids or imprecise, and we will better understand their nature and functions as mental artifacts.

Keywords: art, memory, pictographs, *khipu*, tradition, iconography

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> *There must in the nature of human things be a mental language common to all nations. . . . This axiom is the principle of the hieroglyphs by which all nations spoke in the time of their first barbarism.*
>
> Giambattista Vico, *La scienza nuova*, [1744] 1990

Social memory necessarily involves the remembrance of origins.[1] Within the European tradition, ideas of the emergence of human society, and of its "first barbarism," were long associated with the myth of a universal language common to all humanity. This original language posited by so many authors raised an endless

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series of questions: What did its morphology, grammar and logical structure look like? How did these first pioneers transmit it intact to future generations without a writing system? How did they communicate, both with one another and with God?

In *La scienza nuova* [1744] 1990, Vico appeals to what we might call an *anthropological myth* to answer these questions. He suggests that social memory must, initially, have taken the form of emblems and symbolic figures, because images are the "mental language" which underpins the "principle of all hieroglyphs." For Vico, this myth of a figurative language composed of icons is a logical necessity, and it was to have a significant impact on anthropological thought. Its effects are still visible, albeit in implicit or fragmentary form, in contemporary social anthropology. Just like so many of his contemporaries, Vico doubtless took Egyptian hieroglyphs as an historical model. When Horapollon's treatise on the Ancient Egyptian scripts was rediscovered during the Renaissance, provoking intense debate, hieroglyphs were still widely seen as *imagines symbolicae*, as a coded form of secret knowledge frequently attributed to Hermes Trismegistus or to Moses. Some authors, such as Pico della Mirandola (following Plotinus), interpreted them as the last remaining traces of a divine language, which, by dint of careful riddling, could be made to give up the hidden order of the universe. Others, such as Alberti and Erasmus, more prosaically saw them as a possible model for a universal language. Paolo Rossi's work on seventeenth century science ably seconded by a number of more recent studies (Rossi 1979; Mauelshagen 2003) has thrown up a number of interesting, and still partially unexplored, developments of this idea.

During the Baroque period, the term hieroglyph was deployed in such unlikely fields as natural history, geology and zoology. Rock crystals, fossils, geological strata, freaks (two-headed babies, hermaphrodites or human-animal hybrids) were seen by doctors and earth scientists as *hieroglyphs of nature*—prodigious signs by means of which the natural world revealed its secrets. Francis Bacon definitively formulates these monsters as "spontaneous" scientific experiments where the laws of nature, untroubled by human intervention, give themselves to see. Later, in the work of Goethe, the hieroglyph becomes a prototype of the originary form of living creatures: an immediate and abstract manifestation of the underlying unity connecting natural phenomena and the human spirit. Over the course of the eighteenth century, this naturalist interpretation of the hieroglyph is joined by the more abstract visions of Leibniz, d'Alembert and Condorcet. Here we witness the full emergence of an idea already implicitly present in Vico: that of the *mental hieroglyph* or "universal character," which could be expressed either linguistically or mathematically. One hundred years later, this same idea would drive Frege (1965) to elaborate his *mathematical ideography*—a symbolic system independent of natural languages and capable of rigorously representing the laws of propositional Logic. The idea of a mental hieroglyph embodying a direct, and linguistically unmediated, relationship between concept and image has been a widespread, persistent and productive theme throughout modern thought (Assmann and Assmann 2003). For several centuries, however, its principal field of application was speculation on the origins of mankind. For linguists, anthropologists and archaeologists, up until the end of the nineteenth century, it was a given that the emblem always preceded the sign in primitive society. This was assumed to be a universal principle derived from the very nature of the human body.

In *La Scienza Nuova*, Vico had noted that hieroglyphs were an application of the same principles that regimented "mute" or sign languages, which made use of "gestures that have a natural relationship to the things they are intended to signify." This, he suggested, explained why hieroglyphs the world over (from the West Indies of Mexico to the East Indies of China) seemed to derive from the same principles. For Vico, the hieroglyph was the model of the unitary principle of the human genus ("*senso comune del genere umano*"), which he placed at the heart of his theory. According to this principle, "uniform ideas [are] born among peoples unknown to each other," which in turn gives rise to the "mental dictionary" characteristic of all human cultures (Vico [1774] 1990, vol. I: 499).[2]

According, then, to the myth of the universal language, human memory was initially preserved by means of images. This myth was particularly influential among historians of writing, who long distinguished between an iconic, uncertain and primitive "writing of things" and a later, more evolved "writing of words," but it also affected the wider study of the art of memory. The two figureheads of this now burgeoning field of study, Paolo Rossi (1960) and Frances Yates (1966) both emphasize the hieroglyphic character of the *artes memorandi* or arts of memory. The latter, influenced by the work of Aby Warburg, set out to demonstrate the existence of a number of classical, astrological, magical, and more generally neo-platonic ideas within the field of mnemonic techniques—and this as late as the central Renaissance period. In contrast, Rossi (and later Jean-Philippe Antoine, 1993) adopted a philosophical approach highlighting the relationship between memorization and inferential techniques, which played a central role in arts of memory from Raymond Lull to Linnaeus. It would, however, be an error to over-stress the opposition between these two approaches. In practice, the arts of memory have the same double-headedness as the myth of an original language. Qua mental languages, they are either seen as bearers of a kind of magic associated with this first language (by, for instance, Camillo, Bruno or Agrippa von Nettesheim) or (as with Erasmus, Leibniz or d'Alembert) as precursors of a future universal tongue, which must be forged out of advances in scientific, and more particularly taxonomic and mathematical, knowledge. These ideas are still alive and well today, and not just in anthropology. In his intervention to a debate on the "universal language" promoted by the journal *Critique* in 1979, the mathematician René Thom could happily exclaim "why speak of the myth of a universal language? Nowadays, there is at least one universal language—that of science." This is extremely close to the position of Paolo Rossi, for whom the historical outcome of the arts of memory can be seen in the work of Linnaeus. Frances Yates, for her part, identified "symptoms of the search for scientific method" in the classical Arts. In other words, references to a fundamental language and to the development of rational thought are present in the works of both of these pioneers of the study of the arts of memory.

The arts of memory, then, are not a survival (or possible development) of a particular magical or scientific paradigm. Instead, they allow us to study historically and culturally situated practices of thought. This more anthropological approach to the subject is explored in the recent works of Mary Carruthers (1990, 1993, 1998)

2. On Vico and the origins of anthropological thought, see also Berlin (1976) and especially (1990).

and Lina Bolzoni (1995, 2002). The two historians propose to address the *artes memorandi* as "crafts of thought," which bring together a whole range of memorization and mental imaging techniques. According to them, memorization techniques (along with the taxonomical organization of knowledge to which they give rise and the historical *longue durée* in which it is inscribed) cannot be seen as the conceptual socle for one singular vision of the world, but instead as a sort of historical artifact that can be used in a variety of contexts—ranging from the systematization of knowledge to pedagogics, from prayer to meditation and even to the composition and reading of particular texts. The only thing distinguishing this set of techniques from an actual material tool is that it is a *mental* artifact, a tool of thought. In this article, I take the conclusions drawn by these two historians as the starting point for my analysis of the arts of memory within a number of Amerindian traditions. The wider goal of founding anthropology of memory, to which this article is but a contribution, may seem surprising. The existence of *several different* arts of memory, each characterized by a precise constellation of what Paolo Rossi sees as key to the *artes memorandi*—the relationship between recollection, classification, and inference, on the one hand, and evocation, ideation, and imagination on the other—is something that has passed most anthropologists by. Diligent fieldwork may have uncovered different memorization techniques in Oceania (Wassman 1988, 1991; Harrison 1990; Silverman 1993), Africa (Nooter and Roberts 1997; Kubick 1987) and the Americas (Hoffman 1891, 1898; Mallery 1898; Ewers 1979), but the idea that the underlying logic of memorization might influence so-called "oral" societies, and thus that we might be able to develop an *anthropology* of the arts of memory to complement the work of historians, is not one that has gained much traction within the discipline.

This project necessitates several shifts in perspective. First, and most radically, we must tilt at the opposition between oral and written traditions—one of the fundamental artifacts of social anthropology. Elsewhere (Severi 2007), I have argued that this opposition underlies a number of anthropological misunderstandings: traditions that anthropologists have tended to describe as "oral" are very often better thought of as iconographic. In many cultures, social memory appears to rely only on the spoken word when, in fact, images play a central role in the transmission of knowledge. In cultural facts that depend on such transmission, there is then no symmetrical opposition between orality and writing. The counterpart of writing is not merely the spoken word, but the hybridization of word and image in the form of a mnemonic device, most commonly in ritual contexts.

If the socialization of memory is to become a fully-fledged anthropological object, then we will need a new definition of tradition—one that is no longer defined in terms of semiotic means of expressing knowledge (oral, written, etc.), but according to the precise nature of the prevailing relationship between words and images.

Historians of the arts of memory, for their part, will need to make space within their findings for new perspectives drawn from outside the Western world. This new approach implies a combined comparative and reflexive research strategy. If the idea of the art of memory is to be applied to non-Western traditions, then it is not enough merely to show that some of its concepts can be fruitfully applied to their memorization techniques. We must also bring what Lévi-Strauss called "the view from afar" to bear on the Western case. Seen from this perspective, both

classical and medieval arts of memory can be classified as belonging to one ideal type from a whole series of thought techniques that can give rise to a tradition.

The false opposition between orality and writing, the reluctance to compare the West with the Rest, and the complexity of the relationship between the arts of memory and writing techniques have together contrived to hamper our understanding of the memory techniques that we find in non-Western oral traditions. This difficulty is, however, not merely theoretical. The study of these techniques frequently throws up little-studied objects that are also extremely hard to conceptualize. Our customary categories (drawing, symbols, ideograms, pictograms, semasiography,[3] writing, etc.) are ill adapted to these objects, which are normally vaguely described as "mnemonics." It is also frequently hard to grasp their underlying logic. One example of this is the Americanist debate surrounding *khipus*, the Incan cords containing different types of knots used to convey messages or memorize data. Recent research (Ascher and Ascher 1981; Urton and Llanos 1997; Urton 1998, 2003; Quilter and Urton 2002; Salomon 2001, 2002, 2006; Pärsinnen and Kiviharju 2004; Déléage 2007) has thrown new light on the technical uses and the social import of these mnemonic devices. This research builds on the fact that *khipus*' primary purpose was to carry numerical information and their use was tied up with the control of different elements (made up of people, goods, ritual offerings, tribute, and even units of space and time) managed by Incan bureaucracy. The use of *khipus* is, then, as Gary Urton pithily puts it, a particularly developed example of the "social life of numbers." This is confirmed by a number of historical sources, which confirm that the Quechua word *khipu* means both "knot" and "numerical calculation" and that the verb *khipuni* similarly means both "to tie a knot" and to "do a sum" (Gonzales Holguin [1608] 1989: 309; Garcilaso de la Vega [1609] 1991, I, book 6, chap.7–9; Cummins 2002). We know, however, that this interpretation only holds for certain *khipus*: those where the relationship between sections of cords or sets of cords is regular and assimilable to a numerical order. In these cases, the use of series (or even of series of series) of cords helps rigorously to record and memorize large sets of numbers (on a decimal base) and a small number of qualitative categories signaled by, say, color, the way the knot is folded or the direction of the cords. Urton notes that a significant number of *khipus* kept in museums (roughly one third out of six hundred) lack this regularity and so cannot be seen as arithmetical aids. A number of historical sources (notably Guàaman Poma's *New Chronicle* edited by Murra and Adorno 1980, but also cf. the collection of texts assembled in Parsinen et Kiviharju 2004) suggest that these *khipus* were used to memorize texts containing names of people and places (Murra 1991), but we are still unclear as to how exactly the system might have worked. How are we to understand a mnemonic device that relies on the same mental operation (the creation of ordered series) to fulfill such diverse functions as numerical calculation and the memorization of a text? Contemporary debate on the issue is as lively as it is undecided, with partisans of the different camps frequently limiting themselves to fighting over whether *khipus* are "true" writing or "just" a mnemonic device. Most of these authors use the term "mnemonic device"

3. Gelb (1973: 282) defines semasiography as a "fore-runner of writing . . . which allows for communication by virtue of meaningful signs that are, however, not necessarily linguistic in nature."

to describe an "arbitrary and individual means of memorizing," which "follows no standard rules" (Cummins 2002: 55). It is without doubt Gary Urton who most clearly exemplifies this opposition (universally accepted within the field) between "writing" and "mnemonic device." To show that *khipus* could not be reduced to mere mnemonic devices, he initially proposed to distinguish between different types of *khipus*: mnemonic ones for general use and more codified ones for bureaucratic use. Later, he argued (against authors such as Marica and Robert Ascher and Martti Pärssinen) that all *khipus* are derived from a pre-Hispanic form of actual writing. Urton notes the capacity of certain *khipus* to record verbs or sentences and speaks of the *khipus*' "high degree of syntactic and semantic information" (Urton 1998: 427). He specifically notes, "the *khipu* recording system more closely approximated a form of writing than is usually considered to have been the case" (ibid.). More recently he has proposed a third hypothesis: that *khipus were reduced to mere mnemonic devices* by the violent transformations undergone by Inca society during the early colonial period. The damage had been done as early as the late-1590s, leading to the elimination of fully grammatical constructions (of the type subject-object-verb), which were replaced by attenuated, non-narrative representations principally comprised of names and numbers.

Beyond, however, the hypothetical transcriptive powers (the forms and tenses of verbs, as well as certain epistemic classifiers)[4] attributed to it by Urton (1998: 428), it is hard to imagine just how this precolonial knotted language might have worked. It is worth remembering that "true writing," according to De Francis's (1990) definition, uses a finite number of signs to give a complete representation of the spoken language. But how could a *khipu* notational system cover the entire range of words in the language? In any case, as Cummins points out, *khipus* order the varied information they contain, be it words or numbers, by "producing an image of the memory, rather than by representing that which they are meant to preserve" (Cummins 2002). In other words, the arrangement of *khipu* cords into a series of logical arborescences indicates a train or process of thought and tells almost nothing of their actual content. In these conditions, how can we conceptualize the transition from the memorization of numerical series to historical narratives? This leaves one central question almost wholly unanswered by adversaries from both sides: what kind of conceptual unity underpins these different mnemonic usages and, by extension, what is the *logical structure* of these *khipus*?

Further empirical research will doubtless shed light on this question. In the meantime, however, it is as well to consider the following broad theoretical point: the opposition, inspired by the classic work of Gelb (1973), between mnemonic devices and writing is, in fact, extremely fragile from a conceptual point of view. For Gelb, just as for the other authors mentioned above, all of these diverse techniques must necessarily fall into one of two camps. Either a society relies on oral memory, giving rise to loose, fragile traditions, or it develops techniques for transcribing language, leading ultimately to writing. Many Amerindian cultures, however, fall outside this crude opposition: the practice of social memory and the

4. An epistemic classifier (or "evidential") is a suffix indicating the nature of the information conveyed in a proposition. For instance, an evidential might indicate whether the information was generated by direct experience or is unverifiable rumour.

use of organized iconographies go together in these traditions, which developed arts of memory that cannot be reduced to either writing or to individual mnemonic devices. We will return to these matters later. For the time being, let me just note that *khipus* are not the only Amerindian graphic representations to call our categories into question by virtue of their hybridity. Throughout the length of the Americas, we find pictographic traditions that, from the point of view of Western semiotics, seem to realize an "impossible combination" of picture and sign. Historians of writing have long hummed and hawed over how to define these images. With the notable exception of Diego Valades who, as early as the fifteenth century, spoke of them in no uncertain terms as memory images, most specialists have reduced their analysis to the opposition with alphabetic writing systems. This long list of authors might begin with Michele Mercati who, in 1598, referred to them as "Indian hieroglyphs," and end with Hoffman and Mallery's (Hoffman 1891, 1897, 1898; Mallery 1893) definition of Amerindian pictograms as "rudimentary means of transcribing basic ideas." And in between, we find all kinds of mysterious *paleographic* interpretations dreamt up, but rarely described, by countless European and American chroniclers and geographers.

In some ways, the current debate surrounding *khipus* echoes these older controversies. I suggest that we can only understand the logical structure of these mnemonic devices by abandoning older and invariably ethnocentric approaches based on the opposition between *khipus* and writing in favor of a comparative anthropological perspective. The question, then of whether pictographic systems or *khipus* are "true" writing or "just" mnemonic devices is of no interest to us here. Instead, I propose to explore whether *khipus* and pictograms, qua organized mnemonic and graphic systems (however apparently distant they may be), share any common formal traits, thereby implying comparable mental operations. Can they, in other words, be fruitfully compared independently of any reference to writing systems? By focusing on the subtendant mental operations, I enquire as to whether they belong to the same mental universe, and so whether Amerindian arts of memory share a common *mental language*, to borrow Vico's term. In this way, we will see that *khipus* and pictograms are not, in fact, unruly hybrids defying classification, but mental artifacts whose nature and function can be understood in their own terms. These analyses, based on the exposition of several necessarily coarse-grained case studies, then give rise to a description of the logical elements which underpin the universe of Amerindian arts of memory. The word *universe* as I use it here (as a horizon for research and not as an attempt to reduce the immense diversity of Amerindian cultures to one common form) has both a geographical and a logical sense. It is defined by the set of mental operations implied by the use of these memorization techniques as well as by a specific group of cultures.

Amerindian arts of memory: A case study

We have already noted that our traditional semiotic categories (drawing, pictogram, ideogram, etc.) fail to do justice to non-Western techniques of memorization. They do not give us the tools to produce coherent descriptions of how these graphic forms function. Instead of trying to classify these little known graphic systems *a priori*, we need to begin with empirical analysis of mnemonic iconographic systems and then delve into the mental operations on which they rely. Let

us begin with what superficially looks like a fairly straightforward case: Yekuana weaving. The Yekuana, who speak a Carib language, now live in the Upper Orinoco region between Venezuela and Brazil, though they probably originally came from Southern Amazonia. The work of a number of ethnographers, most notably Marc de Civrieux (1970), has given us a detailed knowledge of the myths of these Amazonian hunters and agriculturalists. They consist of a long cycle of stories detailing the different episodes of a bloody conflict that they believe orders the universe. On one side, there is Wanadi, a positive being associated with the sun and who presides over human culture (agricultural, fishing, hunting, and tool-making techniques), and on the other his twin brother, Odosha, who is the incarnation of evil, misfortune, illness, and death. For the Yekuana, this cosmic conflict is not simply a schematic representation of the origins of the universe. Though it dates back to the dawn of time, the brothers' struggle is unending: it continues to affect people's everyday lives, often with tragic consequences. This lack of harmony can be traced back to an original dissymmetry between good and evil and between humans and their potential enemies, be they animal or vegetable in nature. For the Yekuana, evil always wins out over good. This is why their ally, Wanadi, lives in a far-off region of the heavens and has little contact with the human world. His twin brother, Odosha, is an ever-present danger; he lives in close proximity surrounded by his demons, often represented as the invisible "masters" of animals and plants. This also explains why Odosha is represented by a whole series of malefic creatures: howler monkeys, serpents, jaguars, or cannibal strangers, whereas Wanadi, alone in his sky-realm, singlehandedly protects his people. The Yekuana claim that the "invisible masters," who are seen as owners of animals and plants, perform each act of hunting, fishing, or agriculture in the teeth of opposition. This universe inhabited by potential threatening enemies is that of Odosha and his demons. Each time humans perform some act necessary to their survival, they must face retaliation, which they try to ward off with apotropaic chants, but which sometimes strikes nonetheless. As well as being thought of as dissymmetric, good and evil are also constantly transforming into one another: the Yekuana believe that each cultural good or technique they possess (weaponry, weaving, body ornamentation, or painting) is the result of a transformation of evil or of the beings who depend on evil. It follows that all living creatures are inherently ambiguous: everything that might be seen as useful or beneficent (including the woven baskets that people decorate as part of marriage preparations) contains a "transformed share" of evil.

There is no space here to explore this mythical tradition at length, but it is worth raising one point, related to the accompanying iconographic tradition. When Marc de Civrieux published his first collection of Yekuana myths, he asked several of his informants to illustrate the stories of Wanadi and Odosha (see figure 1). Drawn in an uncertain hand, these crude representations of humans, huts and trees are perfect illustrations of prevailing ideas of Indian pictograms as, in Hoffman's discussion of the Inuit, "rudimentary means to represent basic ideas" (Hoffmann 1897).

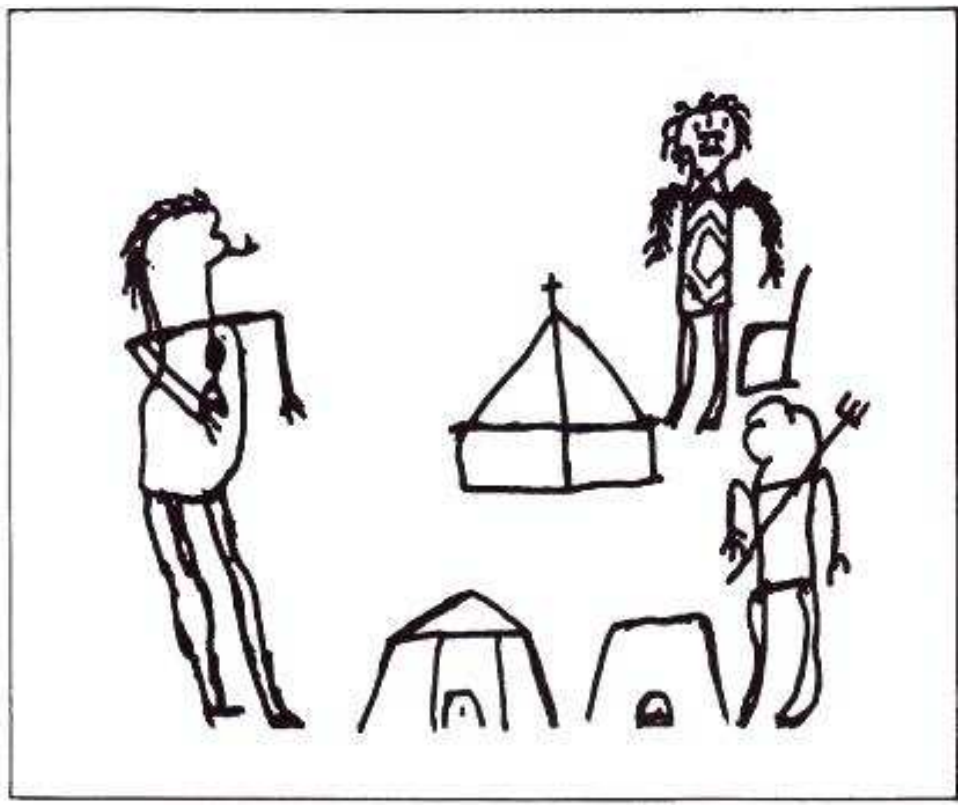


Figure 1. Yekuana "pictograms" illustrating the myths collated by Marc de Civrieux (from de Civrieux 1970).

We have Donald Guss (who carried out two major field studies among the Yekuana in 1976 and 1984) to thank for a double discovery concerning these myths. First, he was astonished to find that the Yekuana never actually "told" their myths. Contrary to what one might have expected from Civrieux's collections of myths, "there were no neatly framed 'story-telling' events into which the foreign observer could easily slip, no circles of attentive youths breathing in the words of an elder as he regaled them with the deeds of their ancestors" (Guss 1989: 1). Though mythology was omnipresent in everyday conversation, its enunciation was always fragmentary, allusive, and episodic. His initial goal of recording and transcribing their creation epic, *Watunna*, in the Yekuana language, would have taken years. Yekuana society, he noted, had only two contexts in which these myths received a fuller expression: in the images woven into baskets and in songs, which are often exclusively composed of lists of names of spirits (ibid.: 36). The handing down or transmission of myths, which only really took place during weaving sessions, did not take the narrative form that Civrieux unwittingly gave the reader to expect, but involved iconography and the enunciation, in a specific context, of a list of proper nouns. In other words, the fact that Civrieux's collection of myths took a narrative form is the result not of Yekuana practice, but of two processes quite alien to Yekuana tradition: the transformation of myths that had nothing of the organized corpus about them into a suite of chronological episodes stretching from the dawn of time until the present, and the disingenuous

incorporation of supposedly "indigenous" pictograms for purposes of illustration. Guss realized that these twin processes had completely distorted the practical form taken by this mythical knowledge. Though Civrieux faithfully reproduced some of the myths' content, he fundamentally traduced them by misrepresenting the way they were performed and transmitted.

This realization has implications for our understanding of Yekuana iconography. Having spent much time learning local weaving techniques, Guss was in a position to confirm that the Yekuana did indeed have a form of graphic representation associated with their mythology. But this was not the pictographic representation of Civrieux's collection. Individual imagination played no part in this graphic tradition. Instead, the designs, based on weaving techniques, were regular, abstract, and geometric—and there was only a limited number of recognized themes. Guss managed to identify roughly thirty of them. The crude human and animal figures, the tottering huts and crooked horizons found in Civrieux's book had no place in Yekuana tradition. And these differences were not restricted to mere form. The iconography identified by Guss was strictly limited in scope: it did not represent mythical actions or particular episodes, but only the names of certain key characters. These woven patterns incorporated abstract, geometric, and vaguely iconic representations of a few central figures as the Toad, the Serpent, or the Bat (see figure 2a and figure 2b).

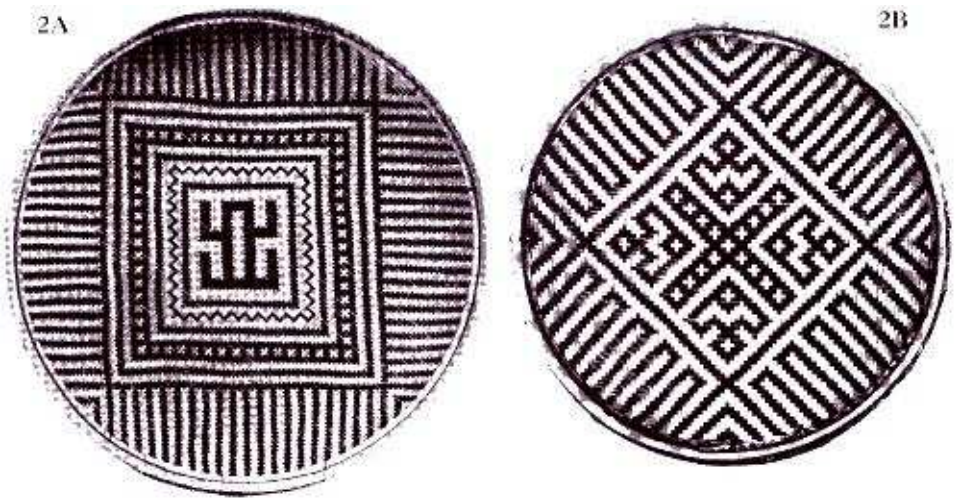
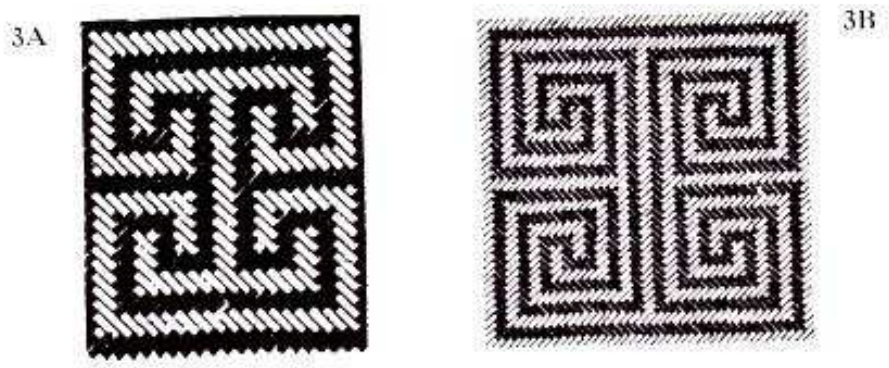


Figure 2a and 2b. "Toad" and "Bat" in traditional Yekuana iconography (from Guss 1989).

One of the most startling aspects of Guss's observations was that Yekuana pictograms (just like the ritual chants sung to crops and the "masters/owners of prey") only record proper names. Guss convincingly argues that the true *mnemonical centre* of the Yekuana mythic tradition lies in these lists of names (both toponyms and anthroponyms). The different successive mythical eras are indicated by the use of particular toponyms and stories are remembered "around" their central characters. It stands to reason, then, that the visual memory of myth

amounts to a finite and well-identified "catalogue" of proper nouns. But how does this visual memory function? Analysis of the graphic schemata typical of the iconography indicate that rather than presenting particular mythical sequences in more-or-less "realistic" fashion (as Civrieux's illustration seem to have done), Yekuana pictograms reveal a deeper level at which mythical knowledge is organized. As we have seen, the two central ideas of these myths are of a constitutive opposition between two sets of characters and the constant process of transformation that affects them. These metamorphoses in turn take two distinct forms. On the one hand, there is the idea of the manifold creature (such as Odosha), who "adopts the form" of a whole series of different beings. And on the other, this ceaseless process of metamorphosis (where good is necessarily the result of a transformation of evil) can lead to creatures being endowed with a constitutive ambiguity, which is both positive and negative. Yekuana iconography allows for the precise, economical rendering of these two organizing principles in visual terms. In fact, the visual terms that translate the names of spirits are all derivations of a single graphic pattern: a sort of inverted "T" representing Odosha (see figure 3a)

Here it is clear that a few simple geometrical transformations allow all the other mythical characters to be derived from a single graphic pattern. In fact, these graphic representations underline the simultaneous multiplicity of these creatures (monkey, toad, or serpent—as in figure 3b—and so forth) and their deeper originary unity.



Figures 3a and 3b. Odosha and Awidi, the serpent
(from Guss 1989).

The different characters are, then, constructed from one fundamental form and form part of a wider system that not only identifies particular characters, but also their possible relationships. These relationships between figures (of analogy, inclusion, or transformation) bespeak an organizational structure, proper to this system of representation, which is based on the principle of unity. Furthermore, the visual technique in question also contains a possibility of slippage between form and ground that allows for the representation of a specific being *and* one of its possible metamorphoses. This possibility of double-representation (or better, of representation in the form of a potentially dual being) applies to several mythical characters: monkeys, bats, and toads. The most striking example is, without doubt,

the *Woroto sakedi*, which depending on whether one focuses on form or ground, shows either Odosha or one of his serpent avatars, Awidi. In fact, as Guss himself noted, the real subject of Yekuana iconography is not such or such a character, but the ongoing transformation of one into the other (Guss 1989: 106, 121–24).

Working up from one elementary form of the pictogram (which is always retained, but always transformed), this apparently simple iconographic series manages to organize the visual space of representation in increasingly complex ways. Within this visual space, all beings (even Wanadi!) are the result of a transformation of Odosha. These forms are created by dint of additions, variations and relationships of inclusion, repetition, and inversion, which all testify to their fundamental unity. This technique translates the mythological universe into visual terms by compiling an iconic memory of key characters.

Yekuana weaving shows how crucial iconography can be in so-called "oral" traditions. Between the two opposing poles of exclusively oral and written traditions, there is in fact a wide range of hybrid situations where neither extreme dominates. When one makes the effort to identify the means by which such knowledge is transmitted, we find (as in the Yekuana case) a specific set of mnemonic interactions between a certain type of image (structured according to one dominant visual schema and belonging to a finite and often quite limited set) and certain categories of words, especially organized series of proper nouns. In Western societies, we are inclined to assume that as words and images are everywhere present in society, any form of visual representation or proposition can serve as an *aide-mémoire*. Field studies, however, suggest that the emergence of an iconographic tradition necessarily implies the formation of a specific discursive field concerned with visual representation. In "oral" cultures, such as that of the Yekuana, not everything can be visually represented; instead, iconography tends to be applicable to one particular sphere (e.g., mythology). Within this context, several levels of relations are created between the linguistic domain (in particular, special toponymical and anthroponymical lexicons) and iconic representation.

The analysis of several ethnographic cases has shown (Severi 1997, 2007) that three distinct operations underlie the emergence of such mnemonic "domains of representability" in the Amerindian context: the choice of which words to represent; the creation of a cognitively salient visual medium of representation; and the ordering of a particular space (which for the Yekuana takes the form of a series of transformations of a basic geometric shape giving rise to a range of visual terms). These operations are further linked to the linguistic forms taken by traditional knowledge—here, specific chants. Unlike pictures in "our" cultures, Yekuana pictograms, then, do not simply illustrate stories. They describe relations (of inversion, extension, inclusion, analogy, and so forth) between mythical beings in iconographic terms. Pictograms, qua graphic images, imply the existence of a coherent iconography and a particular form of traditional knowledge. They cannot be thought of as graphic elements "invented" by individuals (as many scholars have seen them), but must be understood as *relationship markers*, signaling the nature of the connection between a knowledge set (and the mental operations implied by the set) and a graphic form determined by a particular iconographic tradition.

Pictography and memory: A model

These initial reflections on an apparently simple case study suggest that the evolution of Amerindian pictography depends on the development of two parallel axes. On the one hand, the emergence of an increasingly precise and refined iconography (with its particular themes and graphic style) and, on the other, the precise taxonomical organization of knowledge that can be pictographically represented. I have discussed this in detail elsewhere (Severi 1997, 2007), but here it will suffice to consider the pictographic representation of proper nouns. The knowledge set that, among the Yekuana, takes the elementary form of a simple list of mythical characters (Jaguar, Toad, Serpent, or Monkey) can, in other cases, be more precisely organized along increasingly complex relational axes. This can be seen in Kuna pictography (one of the most highly developed Amerindian systems), which makes use of lists of proper nouns represented by pictograms and associated with fixed narrative phrases that are only ever pronounced orally. In the Demon Chant (Severi 2007), for instance, the spirit-villages that the shaman must visit are depicted in fixed graphic form and linked to a specific oral parallelistic formula. Let us consider an example. Here is how the text describes the underground villages (located at the fourth chthonian level in Kuna cosmology, which has eight), which the shaman's auxiliary spirits are to visit in search of a sick man's lost soul:

> *Far away, there where the sun's canoe rises, another village appeared*
>
> *The village of the monkeys appeared*
>
> *The village shows its monkeys*
>
> *Far away, there where the sun's canoe rises, further still, another village appeared, the village of the threads (snakes) appeared*
>
> *The village that coils up like a thread appears*
>
> *The village that coils up like a thread reveals itself*
>
> *The village that coils up like a thread and the village of the monkeys unite like two canoes in the sea they crash into one another*
>
> *Seen from afar, from far far away, the two villages unite, they seem to touch*
>
> *Far away, there where the sun's canoe rises, another village appeared*
>
> *The village of the skirt appeared*
>
> *The village shows its skirt*
>
> *Far away, there where the sun's canoe rises, further still, another village appeared, the village of the creepers appeared*
>
> *The village of the creepers appeared*
>
> *The village shows its creepers.*

Let us compare text and picture board (see figure 4).

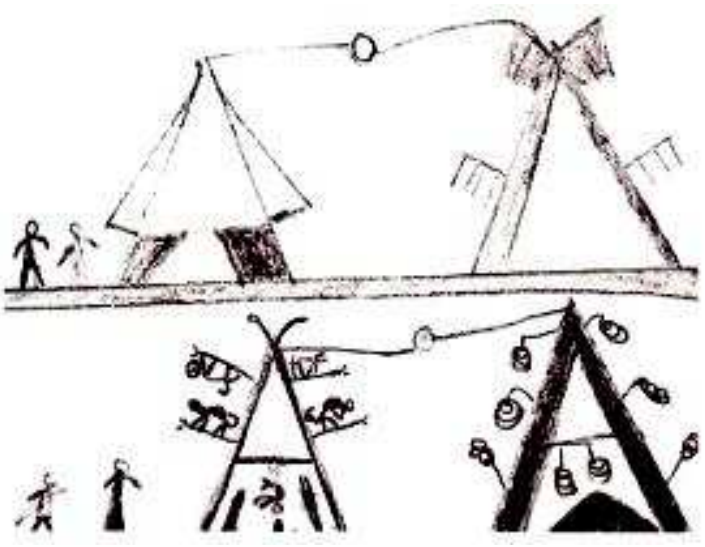


Figure 4. A picture-writing from the Kuna Demon Chant (from Severi 2007).

Pictography does not transcribe all the words that are recited, but the choice of the words transcribed is by no means left to chance. Following the alternation between repeated formulae and "lists of variations" which structures the parallelistic text, the pictograms refer only to certain words in the chants, and indeed to those very words which, at particular moments in the course of the chant play the role of variants in relation to a set formula. Transcription translates into images only the list of variations (the names of the villages: monkeys, threads, creepers, and so on). Throughout the Demon Chant, the verbal formula that provides the narrative structure of the text ("Far away, there where the sun's canoe rises, further still, another village appeared") is never translated into pictograms.

The picture writing transcription of a Kuna chant consequently involves three separate elements: a graphic formula and a verbal formula, both constant and independent of one another, and a variation of the text translated into pictograms. Far from being completely superimposable on one another, the two graphic and oral codes, each provide specific information.

In other passages of the same text, we find even more complicated lists of names, created by incorporating the names of spirits into village names. Thus, the third part of the Demon Chant, entitled "the path that leads to the spirit villages," contains names of villages (e.g., Village of Dances, Village of Transformations, or Village of the Homecoming) inhabited by several different sorts of animal spirits: deer, wild boars, monkeys, birds, butterflies, and so on. As such, the text consists of a series of logically "nested" groups of names, each associated with a particular pictogram and fixed oral expression (see figure 5).

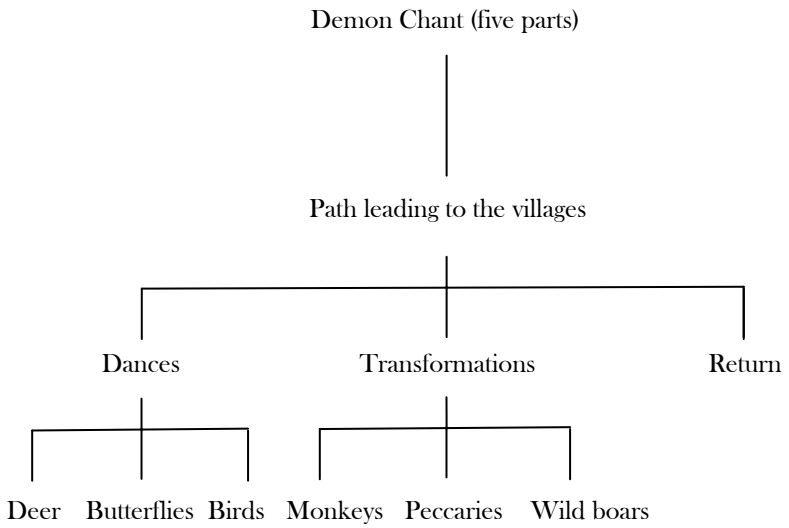


Figure 5. Logical "nesting" of lists of proper nouns in the Kuna Demon Chant.

In other cases, these nested series are replaced by alternating series or small clusters of proper nouns. So what looks like a straightforward series of pictograms when drawn on mnemonic boards, is in fact subject to relatively complex decoding processes (Severi 2007: 166–76).

Elsewhere in the Americas (among the Plains Indians, for example, or in Nahuatl and Maya pictographic traditions), pictograms designating proper nouns and, just as with the Kuna, their accompanying formulae, are inserted into other forms of stable graphic schemata. One good example is the "pictorial autobiographies" of Plains Indians where pictograms detailing proper nouns are linked to images of the horseman heading off to hunt or do battle. In such cases, the proper noun pictogram (here, "Bow decorated with feathers") is slotted into a predetermined verbal formula. Figure 6 (see below), then, could be transcribed as "The bare-faced horseman, whose name is 'Bow decorated with feathers,' launches an attack."[5]

In short, underpinning the wide range of local variation between different Amerindian cultures, we find a series of logical principles determining the use of pictograms. Different narrative themes (the journey, a spirit dialogue, or a war or hunting party) are played out in an oral genre (song, chant, or story) by means of parallelistic formulae with a fixed *word order*. This order transforms the narrative sequence into an alternation between fixed repetitive formulae and suites of variations, often in the form of lists of proper nouns. In the context of this mnemonically organized ensemble of words, the pictogram's role is to give mnemonic salience to the variations. In this way, via the *iconographic transcription of variation*, the pictogram makes it possible efficiently to memorize long, elaborate texts.

5. Regarding this question, cf. Severi (2007: 128–31).

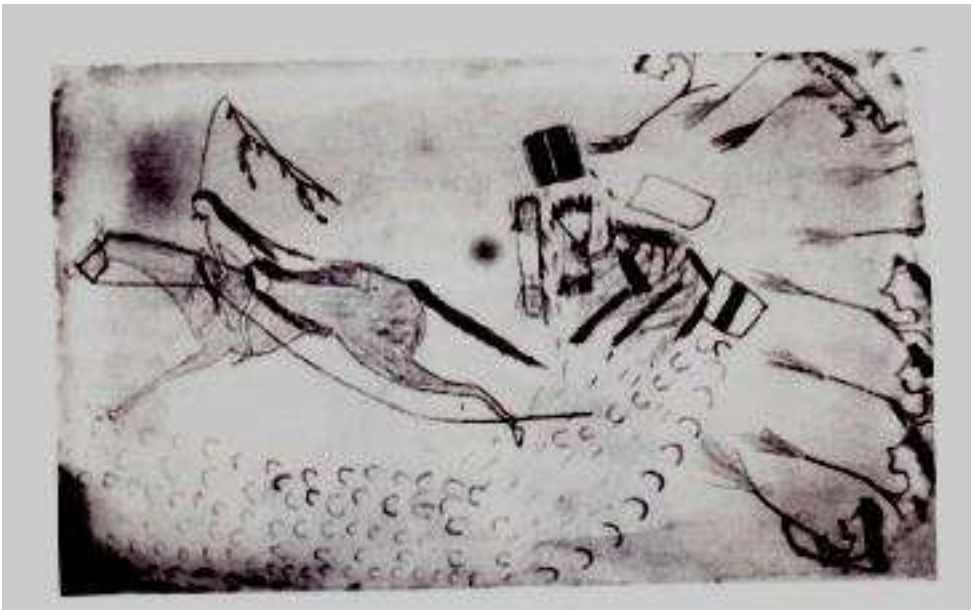


Figure 6. A page from the Dakota Bible
(from Severi 2007).

In other words, social memory in many Amerindian societies is based neither on a process analogous to alphabetic writing nor on some vaguely defined "oral" tradition. Instead, it depends on graphic mnemonic devices whose primary role is to describe the relationship between a relatively stable iconographic set and a rigorously structured use of ritual language. Amerindian pictography is not then some abortive forerunner of alphabetic writing, but a supple and sophisticated mnemonic device in its own right, with a shared, coherent graphic style and a regular relationship to memorized texts. It is worth stressing that from a graphic point of view, all pictographic iconography in Native America is:

1. *Conventional.* Each "author" draws on a conventional and recognizable repertoire of graphic themes.
2. *Closed.* Within the discursive space described by the pictograms, it is only possible to refer to certain predefined situations and symbols.
3. *Selective.* The drawers of pictograms use conventional shorthands to evoke complex images. The use of these graphic schemata means that the drawings "select" a limited number of the real images' manifold traits.
4. *Redundant.* The pictograms always contain more information than linguistic descriptions of the particular scene or episode described.
5. *Sequential.* These pictographic systems range in complexity from straightforward examples where the images follow only one form of geometric transformation to cases where they obey to a specific, rigorous linear order—boustrophedon among the Kuna or spirals among the Ojibwa.

Drawing on the examples discussed above, we can outline a preliminary set of mental operations involved in the use of pictograms. First, it is clear that none of these memorization techniques can be described as "arbitrary" (Urton) or "based only on individual memory" (Cummins). In America, as elsewhere,[6] the art of memory is based on the ordering of shared knowledge (referred to here as a *tradition*) and on a salience-effect that allows one to distinguish between individual terms within a sequence. Together, these two operations produce *mnemonic relations*. Unlike semiotic relations used in writing, mnemonic relations do not establish a connection between a sign and its real world referent. Instead, they rely on a set of visual inferences, based on the decoding of complex images, which establish a relationship between an imagistic memory and a word memory. The effectiveness of memorization techniques in iconographic traditions is not the result of an attempt to imitate the referential path taken by writing (i.e., the representation of the sounds of the language by which written signs designate words and thereby objects), but of the relationship they establish between different levels of mnemonic elaboration. From this, we can conclude that all graphic memorization techniques depend on the *modular organization* of the types of knowledge they represent. One clear example of this is the insertion of graphic representations of proper nouns into increasingly complex linguistic structures (proper noun + narrative sequence, based on inclusion or alternation, etcetera).

But let us push the analysis a little further. These first two mental operations (of ordering and salience) played out in the iconographic process imply two more abstract principles, examination of which will allow us to rethink the relationship between pictograms and written signs. It is useful to draw a logical contrast between those traits that define a writing system and those that define a mnemotechnic, whatever its degree of complexity. Let us take two logical properties characteristic of *all* symbolic sets: power and expressivity. The logical power of a system can be defined as its capacity to attribute predicates, however simple they may be, to a wide range of objects, whereas expressivity allows a system to describe a limited range of objects using a wide range of predicates. Thus, the highly detailed description of a person given by a single image (e.g., a portrait) is extremely expressive, but lacking in power. In contrast, the utterance "all men are mortal" is extremely powerful, but not very expressive. Working our way up from these premises, we can see that in any writing system, such as an alphabet, that transcribes the sounds of a language, the power and expressivity of the language are equal to those of writing. Arts of memory, on the other hand, are systems of symbols whose power and expressivity is never equal to those of language, even though they leave *scarcely any room for individual choice and variation*. The structure of a mnemotechnic, qua mental artifact, is made up of a relationship between operations that attribute salience (which give the system its expressivity) and forms of ordering (which give the system its logical power). The primary function of these two principles is a mental one: the sequential ordering of images (and their relations) has an obvious mnemonic function. Salience, meanwhile, plays a crucial role in evoking and bringing things to mind. In sum, the arts of memory can be defined in terms of three distinct relationships: mnemonic (encoding/evocation), iconographic (ordering/salience), and logical (power/expressivity).

6. See my earlier analyses of memorization techniques in the Sepik (Severi 2007).

It follows that if we wish to analyze an iconographic tradition linked to the use of memory, we must begin by looking at the relationship it establishes between encoding and evocation, ordering and salience, and power and expressivity. Seen from this angle, the Yekuana basket weaving discussed above can be described as a mnemonic iconography with a relatively limited graphic range, weakly organized around the derivation of all its themes (Monkey, Toad, Anaconda, and so forth) from one basic theme (Odosha). This makes the system relatively unexpressive and gives it a limited capacity for ordering (see figure 7).

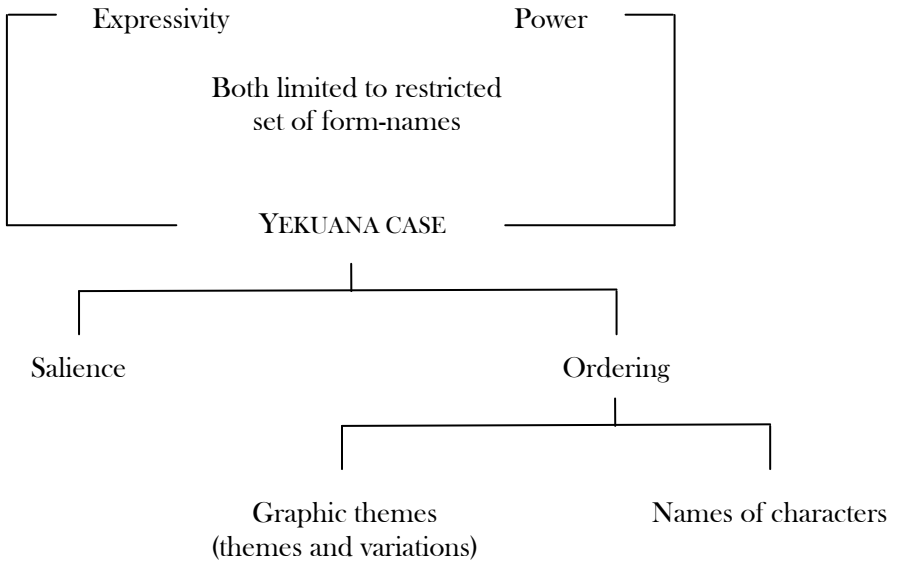


Figure 7: Ordering and salience in Yekuana pictography

The model we are proposing is squarely focused on mental operations and the relationship between iconography and language. There is then no point in trying to compare different arts of memory in terms of their appearance or the tools, materials and techniques used to create and bear them. We are only interested in the relationship between salience and ordering, on the one hand, and power and expressivity, on the other. One final point worth noting concerns the evolution of the arts of memory. The negative vision of pictographic traditions shared by many historians of writing is based on the idea that pictograms are fundamentally sterile—unable to develop because they are little more than abortive, individual attempts to transmit information. For them, writing did not develop out of pictography, but bypassed it completely, following a quite different track: the representation of the sounds of a language. Much research suggests, however, that American pictograms developed in coherent and autonomous ways for several centuries. If we look at the development and evolution of the arts of memory in the *longue durée*, it is clear that they were always *modular* and multilinear—i.e., the development or extension of one aspect of the arts of memory did not imply the parallel development of another. One local tradition might reach a high degree of complexity in the organization and ordering of memorizable knowledge without developing a

refined iconography.[7] Elsewhere, we might find an extremely codified and visually sophisticated iconography with a relatively limited logical power. All Amerindian pictographic traditions are actually characterized by an emphasis on salience rather than power. If we briefly turn our attention to the art of the Northwest Coast of North America, we will find an example of this alternative relationship between salience and ordering.

Eponymous animals: Northwest Coast visual culture

The combined efforts of Boas and Lévi-Strauss turned the Northwest Coast into one of the *loci classici* of anthropological research. This Amerindian "oecumene" (Lévi-Strauss 1975), which brought several distinct cultures together in one homogenous ensemble, has been studied for its mythology, social structure, spectacular rituals of exchange, and its cyclical vision of time, with a radical separation between summer and winter, each characterized by a distinct conception of social existence and the relationship to nature. There is, I think, no need to wax lyrical about the artistic traditions of these cultures. Eulogized by the Surrealists, today it features in all major museums. Art historians and anthropologists have studied it at length, focusing on its different styles, mythical references, artists and aesthetics foundations. Studies of its mnemonic role have been less forthcoming. And yet a coastal totem pole is not merely an instantiation of a particular aesthetic idea. It was also intended to preserve the memory of a name or series of names. Barbeau's (1950) formidable study of totem poles, as well as numerous other works (Inverarity 1950; Smyly and Smyly 1973; Garfield and Wingert 1950), leaves no room for doubt: whether a pole is linked to the memory of a person, a house, a clan, or a moiety, its function is the same—it embodies a series of names of mythical characters (Crow, Whale, Eagle, Bear . . .), the list of which describes the name of a social group.

Figure 8.
The Haïda Black Whale House totem-pole

Take the example of a Haïda totem-pole from the village of Skedans (see figure 8, from Smyly and Smyly 1973).

The totem pole is a sort of "pictographic column," a vertical series of images of "crests" (heraldic emblems), most commonly in the form of animals. This series of crests not only represents the name of a social group (here, Black-Whale House, whose complex name is read from bottom to top as "Black Whale—Crow—Rainbow—Eagle"), but also proclaims ownership (or other forms of control) of particular lands, hunting and fishing territories, or associated privileges. Furthermore, in this tradition, the images always correspond to extremely detailed narrative cycles describing the group's history: from its origin myths to contemporary legends, if such exist. So a totem pole may contain the crest of particularly

7. This is also true of the Oceanian mnemonic devices I have analyzed elsewhere (Severi 2007).

lucky or respected clan chief or even, in one case described by Barbeau (1950), the bizarre portrait of a group of eighteenth century Russian orthodox missionaries. On the Northwest Coast, the totem pole is a multi-mnemonic object. It may simply depict the image or symbol of a person buried at the funerary site at which it stands. Or it may proclaim rights, delimit lands, describe collective origins or evoke key events past and present. In each case, this range of functions is realized via representations (in the form of crests) of lists of names. As we saw in our Amazonian example, the representation of names-as-forms was extremely common in Amerindian pictography. Here again, the representation makes use of a sequential ordering and visual salience, but the ways in which this salience is produced are vastly more complex. By virtue of its specific shape, the totem pole offers an original visual solution to this problem. It has often been noted that Northwest Coast iconography is based on the creation of what we might call an *alphabet of forms*, where each visual theme is meaningful and corresponds to a particular lexeme. This can give rise to a series of forms whereby the animal or human is broken down into its constituent parts: wing, fin, eye, paw, and tail (see figure 9).

Figure 9. Some examples of the Northwest coast "form alphabet" (from Holm 1965).

An eponymous animal can be metonymically represented by one or more of its parts. A good example of this graphic convention is the Haïda representation of the sea-monster Sisiutl, whose reptilian body gives way to images of his three heads (see figure 10).

Figure 10. Representation of the sea monster Sisiutl
(Royal British Columbia Museum, 12909).

As Bill Holm has shown, this process by which entities and their traits (wholes and parts) are abstractly recomposed could lead to "representative" or "distributed" forms of the iconic traits used to depict mythical creatures (Hold 1965) (see figure 11). In fact, the "realist" or relatively abstract nature of these representations is less important, within this tradition, than the organization of space into a plane with a right-left opposition across a central axis. Iconic traits (or the forms of the visual alphabet) are then arranged in accordance with this predetermined spatial structure. The careful reader will have recognized in this description the concepts of the form-line (developed and illustrated by Bill Holm in his work) and split-representation (Holm 1983; Holm and Reid 1975. Cf. also Vastokas 1978: 243–259).

It is worth stressing that this is a dynamic aesthetic. Far from reducing the themes it represents to fragmentary or static representations, Northwest Coast iconography uses them to represent metamorphoses. The different iconic traits that signal the simultaneously fragmentary and emblematic presence of an animal can easily be combined, giving rise to a transformative process that constantly alters their outward appearance. This can be observed in the numerous depictions of mythical figures transforming themselves into a single being, be it some fantastic sea monster, a ritual dancer, or even a shaman possessed by animal spirits. I have explored the visual and mnemonic characteristics of these chimaeric representations of metamorphosis elsewhere (Severi 1991) and this is not the place to dig over old ground. Suffice it to say that the anthropomorphism typical of Northwest

Coast art probably owes its remarkable evocative power to a formal characteristic of the sequences of transformations it depicts.

Figure 11. Representative Space and Distributive Space (from Holm 1965).

In coastal masks, paintings and sculptures, mythical creatures (Woodpecker, Eagle, Crow, etcetera) are *always* represented as a specific combination of human and animal. It follows that the series of metamorphoses described by this iconographic tradition are never composed of binary terms (animal 1 / animal 2) but always contain *three elements* (animal [in human form 1] / animal [in human form 2]). Accordingly, the transformation of one animal into another always runs parallel to a latent anthropomorphism, which simultaneously orients its representational space and endows it with a graphic means of indicating salience. The human element, like a kind of musical *ostinato* repeating the same notes to accompany the changing melody, is always present in the background—a hidden presence in the movement from one animal to another. This is a purely visual and strikingly singular way of signaling the logical unity of the transformative process. Its singularity will become clear if we compare it to the Hopi solution to the same conundrum of how to represent complexity. Hopi ceramics, for instance, make use of simple,

emblematic forms that also refer to name-lexemes (Cloud, Lightning, Serpent, etcetera), which are combined to represent, say, a mythical bird (see figure 12).

Figure 12. A Hopi chimaera
(Peabody Museum of Archeology and Ethnology 43-39-10/25808).

Here too, the image's salience is reinforced, allowing it to bring together different meanings whilst simultaneously abetting the mental reconstruction of beings which are only present in fragmentary from. This visual process could perhaps be compared to a puzzle or a mosaic composed of different elements, which only produce an image once they have been assembled. But in the Hopi case, there is no latent anthropomorphism: the process is not driven by stressing the human element within the linear sequence of visual themes that transform into one another. Instead, it relies on the appeal to one naturally salient form (here, the Bird), which then functions as an ordering principle to which different visual themes can be attached. This use of a salient to establish a particular kind of order produces what we might call a complex salience, quite different from the case of the Northwest Coast art.

To summarize, we have identified three graphic means of creating chimaeras and thus of reinforcing the salience of an image-name: these complex images can either be depicted in an oriented, representative, or distributive space, or alternatively they can occupy a condensed space, which can be linear (as with the latent anthropomorphism of coastal Totem-poles) or inclusive (as with Hopi ceramics, which incorporate heterogeneous elementary forms into one paradigmatic form, producing complex salience). In Northwest Coast art one can also identify yet

another form of salience. Specific substances (shells, pelts, or human and animal hairs) are incorporated into representations to reinforce the visual impact of masks and totem poles. In this way, the purely visual salience produced by the appeal to a set repertory of forms is buttressed by an indexical form of salience.

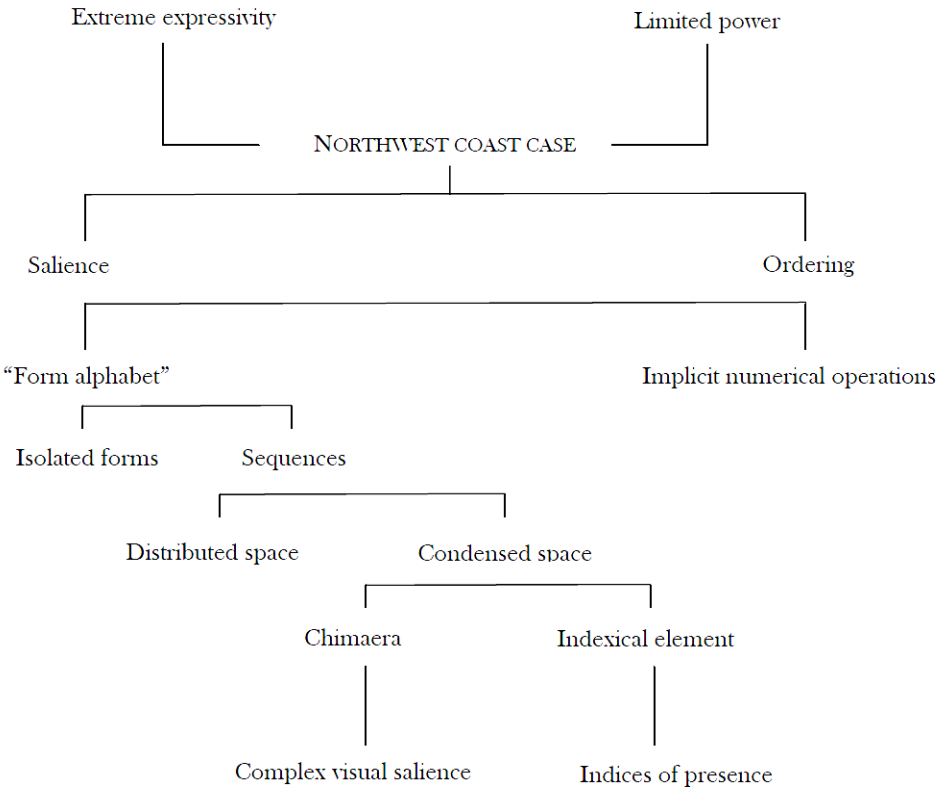


Figure 13. Development of salience in Northwest Coast iconography.

It is worth stressing, however, that these complex trajectories of iconographic salience are everywhere paralleled by a form of logical power, which is strictly limited to the transmission of names. This necessarily implies a sequential ordering of these different forms of knowledge; and indeed, Totem poles are also comprised of organized series. But this order does not constitute a principle likely to engender other forms of knowledge. It simply records the different circumstances that marked a particular social group (individual, clan, or moiety) over a given stretch of historical or mythical time. In short, within this tradition (where the invention of images has given rise to a form of visual salience of a rare complexity) the remembering of names is either circumstantial or passive. The memory it produces is never transformed into an organizational principle that can be applied to other domains of social life. Though it has given rise to an elaborate from of salience, the system is limited and passive when it comes to organizing the knowledge it is supposed to commit to memory. If we adopt the analytical vocabulary outlined above, we might describe the Northwest Coast iconography as a system

that has achieved a remarkable degree of visual salience paralleled by a minimal relationship with the process of ordering (see above, figure 13).

Taken as a whole, these apparently unrelated examples suggest that the development of Amerindian arts of memory is indeed modular and multilinear and has proceeded along the two lines discussed above: the use of taxonomic thought and the creation of a visual form of salience. Each of these levels has its own mnemonic function and endows the mnemonic tradition with a particular form of expressivity and logical power.

Pictograms and *khipus*

What though of Andean *khipus*? Is there, in fact, a place within this comparative schema for a technique so often compared to writing and so often described as something more than "mere arts of memory" (Urton 1998)? Can we apply the three types of relationships discussed above (mnemonic, iconographic, and logical) to a technique apparently limited to numerical calculation? I suggest that we can, but not unless we provide a convincing account of the complex process of ordering which characterizes this system. It is clear that the development of this technique has generated a small number of organizational principles applicable to a wide range of different domains. This coherent development of the taxonomic principle has led to the creation of a system endowed with a high degree of logical power. By contrast, visual salience is limited to marking, albeit with a certain scope for variation, a point (the knot) within a linear sequence (the cord). In this context, the ordering of representable knowledge has probably evolved towards a system that distinguished between an idea of pure quantity (based on a decimal system and applicable to a wide range of categories: people, objects, units of time or space, etcetera) and the equally numerical concept of the ordinal series. This latter category is now divided into numerical series and linguistic series, and the linguistic series are further divided into toponyms and anthroponyms. The numerical series, in contrast, allows for the development of series of series and their organization along decimal lines (see figure 14).

Seen from this perspective, Andean *khipus* can be described as an art of memory possessed of a rudimentary form of visual salience and an extremely complex ordering of representable knowledge. In other words, the Andean system (seen from the point of view of mnemonic, iconographic and logical relations) appears to have followed the opposite path to that taken on the Northwest Coast—and indeed in Native American pictographic systems more generally. Our analysis focuses exclusively on those groups of relations that rely on a certain number of logical elements and mental operations. What matters are the system's logical implications and not its visual manifestations. As we saw in the Kuna case, pictographic traditions may contain implicit numerical operations, notably ordinal ones (series or series of series). Andean memorization techniques started with a standard task, for instance the transcription of series of proper nouns, and then began to distinguish between numbers and names, on the one hand, and between cardinals and ordinals on the other.

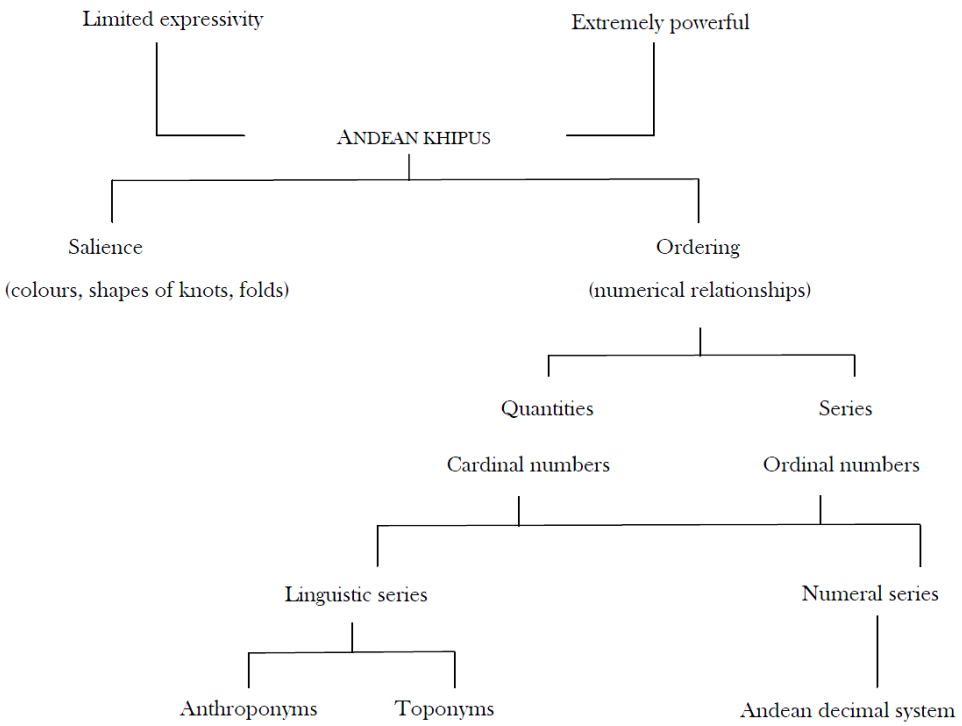


Figure 14: Development of order in Andean *khipus*.

This then allows for a further distinction between qualitative categories (meant to be named) and series of numbers produced using a decimal base. Gary Urton and Primitivo Nina Llanos (1997: 173–208) have convincingly demonstrated that the Andean decimal system is the result of the interaction between two organizing principles related to Andean mathematical thought: on the one hand, an organizational system based on the principle of groups of five (modeled on the five fingers of the hand) and, on the other, the systematic union of series of opposing terms (or moieties) that underpin Andean dualism and give rise to what they call an "arithmetic of rectification." This does not imply that *khipus* are "radically different" from pictograms: many of these memorization techniques rely on the central role played by the act of enumeration. Without the creation of relatively rigorous linear series, where each element has a set place within an ordinal series, Amerindian pictography would be quite impossible (whether it concerned shamanic chants, calendars, or pictorial autobiographies). The narrative form taken by these pictographic traditions should not blind us to the fact that all pictograms rely on certain arithmetic or geometrical relationships. Examples of this range from the relations of inclusion, inversion, or scale-shift (geometric commutation) present in Yekuana weaving to the precisely calibrated, symmetrical, and geometrically oriented spaces of Northwest Coast art. What marks out *khipus* is not then the mere existence of enumeration or the mathematical expression of an equilibrium, but the emphasis placed on the "power" conferred upon mathematical calculation and its application to an increasing number of possible objects. This is testimony to the complex and elegant elaboration of mathematical thought within the mnemotechnic system embodied by *khipus*.

In this sense, Andean *khipus* (which are extremely powerful, but devoid of expressive power) and Amerindian pictograms (which are very expressive, but can only represent a limited range of knowledge) constitute opposite logical poles of the vast spectrum of Amerindian arts of memory. We should not, however, be tempted into constructing overly rigid sets of oppositions. A tradition largely based on the ordering of knowledge will always retain some latent salience and, contrariwise, a tradition that stresses salience can still develop implicit numerical or geometrical operations, even quite complex ones.

Armed with these new hypotheses, we can now return to the intellectual battle regarding the logical nature of Andean *khipus*. Seen from a purely numerical perspective, the *khipus* record two quite distinct types of knowledge: lists of numbers and narratives. Roughly a third of extant *khipus* (some six hundred) display no mathematical regularity. Precisely how this numerically based system was used to memorize narratives remains unclear and has provoked much debate. The work of the Polish historian Jan Szeminski, once placed in the wider context of the unitary system outlined above, may offer a solution to the problem. Szeminski has recently published an analysis of a long neglected text ("Tome II" of Fernando de Montesinos' *Ophir de España*), which reveals certain aspects of the Andean oral tradition (Szeminski 2006). Szeminski quite brilliantly identifies a series of key elements that allow us to rethink the wider chronology of the region in the Inca and, indeed, pre-Inca period. These are crucial discoveries. His textual archaeology (one might even say codicology) evaluates and decrypts, layer by layer, the rich ensemble of indigenous exegeses contained within Montesinos' text, which allow him to reconstruct a series of "narrative facts." These shed new light on whole swathes of Andean history. But Szeminski's work is also of vital interest to anthropologists, because the author almost unwittingly illuminates certain formal aspects of the *oral tradition* whose last vestiges are contained in Montesinos' text. The author progressively identifies the indigenous parses and commentary that accompany these "narrative facts," discovering in the process an *evidently mnemonically oriented* means of organizing traditional knowledge. This process of organization, evident in the "list of One Hundred Kings" that features in Montesinos' book, consists in the creation of a list of names of Kings, each of which is progressively assigned a corresponding eponym. For instance, we come across Amawte ("the scholar or wiseman") or his successor, "the Great Ploughman" (Szeminski op. cit.: 312), etcetera. To this list of names and eponyms is then attached a further list of parses or commentaries. The brief indigenous texts that feature in Montesinos' book (and which Szeminski dubs "scholarly amplifications") are good examples of these. In short, behind Szeminski's "formalist" reading of the text, we discover a tradition comprised of elements organized in typically Amerindian parallelistic fashion whereby series of lists of names are arranged in a specific order and serve as the backbone of an oral narrative.

If we break with the futile distinction between iconography and orality in the Andean tradition and incorporate the use of knotted cords into Szeminski's definition, then we can use it to elucidate the way in which these *khipus* might have encoded (and so helped reproduce, in a specific calendrical sequence) certain texts. We must begin, however, by abandoning the term "narrative," used to describe these mnemonically oriented lists of names. Narrative was, without doubt, just one of several different means of organizing knowledge in the Andean tradition. When the narrative mode was present, it was directed by a relatively systematic means of

organizing knowledge, more reliant on the association and clustering of lists of names (used as *aides-mémoire*) than on a story-like structure. Indeed, if, as elsewhere in the Americas, Andean mnemonic codification was based on the association of three distinct classes of elements (proper nouns [some of which were independently meaningful]; a title or eponym ["the scholar," "the great ploughman," etcetera]; and a parse or commentary), then we could imagine a corresponding form of graphic representation (perhaps capable of developing further degrees of complexity) composed of three differently colored cords, recording proper nouns, eponyms, and parses (or even a particular phenomenon that called them to mind: famine, revolt, invasion, etcetera). Approached from this angle, Szeminski's work allows us to recreate the *form* or (as Jolles [1991] has said, the "state of organization of matter") of memorizable knowledge in the Andean system. This in turn might help us to understand the manner in which sequences of knots and cords might annotate "texts."

We can then formulate the hypothesis that the Andean art of memory (which also made use of pictographic representations) was characterized not by the existence of two radically different systems (pictographic and numeric), but by the flexible use of one unified system, which could stress either expressivity or power. Within this variable system, where cords were normally used to record large, sets of numbers (power), expressivity could be generated by linking parses to lists of proper nouns. Certain latent aspects of the *khipu* system could be used to simulate the logical properties of pictographic mnemonics. Seen from this perspective, *khipu* knotted strings are the very illustration of a logical possibility ruled out by most specialists: that of a *complex* art of memory, wherein ordered sequences are both linked to oral parses or commentaries mentally organized along strictly defined lines, and necessarily associated with an iconic marker. This iconic marker might (as in the "giant *khipu*" analyzed by Frank Salomon)[8] take the form of an object fixed inside a fold or a knot, or might can be a basic geometrical form (as with the *tocapu* studied by Cummins 1994), or it might simply be a "distinctively colored" cord.

This reconstruction (which fits with Urton's and Pärssinen's theories regarding other documents) allows us to identify a characteristic element of pictography within the *khipu* system—to wit, the fact that memorization (or better, the creation of a mnemonic relation) necessarily implies the modular organization of the knowledge it represents. The parallelism typical of both systems is a clear example of such modular organization. In this way, the underlying unity of *khipus* and Amerindian pictography becomes visible: *khipus* offer an original and precise means of associating their constitutive logical elements: the list of names; an imagistic variation linked to an oral commentary; and also the constitutive dualisms that underpin many forms of Amerindian arts of memory (order and salience; expressivity and power; encoding and evocation). Andean *khipus* then possess all the key elements of Amerindian arts of memory.

It is, of course, a task for the specialists to decide how to interpret those *khipus* whose meaning still escapes us, the texts that accompany them some of which we now have access to, thanks to the work of Pärssinen and Kiviharju (2004), and the

8. I refer to the field studies and remarkable analyses of Frank Salomon (2001, 2002, 2006).

sundry graphic designs, pictograms, *keros*, and *tocapu* that must, in all likelihood, have been associated with them. This article has simply endeavored to chart a possible course between the twin rocks of "social" writing and "individual and arbitrary" mnemonic devices that bedeviled the debate on Andean *khipus*, to open up a third way, which is founded on the hypothesis that they share the same logical structure as Amerindian pictography and rely on the same mental operations. Seen from this angle, *khipus* are neither a form of writing, nor mere mnemonic devices, but (by virtue of both their common traits and significant differences) legitimate members of the wider conceptual universe of Amerindian arts of memory. This universe is structured by a particular set of mental operations, which orient and direct a form of thought that finds its expression both in images and in the mental space it occupies. In the Americas as elsewhere, the study of processes of memorization is, by its very nature, a study of thought in action.

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In conclusion, we can say that pictograms (and perhaps also *khipus*) are both iconographic *and* oral, and the function of images in the memorization process is clearly identifiable: the images are not mere *illustrations* of words. To the contrary, the image plays a central role in the construction of mnemonic relations between certain visual themes and particular words, which in turn help organize narratives. We might say that pictograms (and perhaps *khipus*) belong to a realm of traditional, socialized and clearly identified practices and which are, in fact, used as mental artifacts. They are, then, part and parcel of a mental universe that also encompasses a range of practices developed and deployed in culturally distinct ways within the Western world.

These analyses also open up two new perspectives concerning the relationship between iconography, orality and mathematical calculations. We have already discussed the mathematical organization of ordered series present in both pictographic and *khipu* systems. A certain number of mental operations, linked to the creation of numerical, cardinal and ordinal series, seem to play a key role in all pictographic traditions making use of the idea of sequential order. But we have not, as yet, sought to identify the different mnemonic functions at work within these systems that are conventionally described, perhaps a little too hastily, as "ethnomathematical." What is the place of mnemonic processes within mathematical calculations? To what extent are these calculations tied up with graphic notations and what is the role played by mental representations? This article has proposed a critique of the formal aspects of the concept of oral traditions, as well as its neglecting of the role played by images. But the concept's content is also problematic. Oral traditions have, without doubt, been too hastily confined to the narrative mode. Could we instead imagine a form of orality and iconography linked to mathematical calculation, classification, or categorization?

These analyses also provoke a further question, which in turn opens up new avenues of inquiry. This concerns the relationship between mnemotechnic practices (which we have, thus far, firmly linked to the practice of an oral tradition and the role of mnemonic images) and those practices linked to alphabetic writing. By way of conclusion, then, I would like to offer up few ideas regarding the notion of writing and its multiple links to pictography. A long intellectual tradition has accustomed us to thinking of these two systems as mutually exclusive. In this

perspective, pictography only exists where true writing has not, or not yet, been invented. One last Amerindian example will suffice to show that we are, once again, in the presence of a false opposition. We have already discussed one of the major themes of the Plains Indian pictographic tradition: pictorial autobiography. In this tradition, skilful warriors or hunters used to paint a record of their exploits, often on a buffalo-skin coat (Ewers 1979). From a technical point of view, this pictographic tradition comprised two main elements: a repetitive schema, representing the figure of a horseman in an oriented space, and an iconic variation signifying the horseman's name and which was always placed next to the warrior's face. From the 1870s onwards, when Euro-Americans established their dominion over the Great Plains, this pictographic tradition gradually began to move towards a situation where alphabetic writing was not only taught, but also imposed on the Indians, for obvious economic, commercial, and administrative reasons. The Indians rapidly learnt to transcribe in writing all kinds of information, notably for the cashbooks and ledgers of the American army. This period always witnessed the emergence of a specifically Indian usage of these cashbooks. They began to draw their pictorial autobiographies in them. Many of these ledgers have found a place in the collections of American museums. Careful analysis of them shows the pictographic record dividing in two: pictograms as such disappear, while the repetitive graphic schemata gradually move towards a graphic style that art historians identify as the starting point for contemporary Native American art, with its typical themes and authors. What matters for us, though, is that for a significant period of time (at least fifty years), pictograms and writing coexisted. In many ledgers, drawings and alphabetic transcriptions of words alternate or sit side by side. And when the authors of these hybrid documents wrote out their names in letters, they always placed them alongside the warrior's face, in the space traditionally occupied by a pictogram. In other words, the linguistic sign was deployed in a mental space still oriented by the operations (ordering and salience) implied by the use of pictography. In this case, it is precisely not (as has so often been claimed) Amerindian pictography that tries, and fails, to imitate Euro-American writing. Rather, it is writing that has learned to speak the mental language ("common to all nations," as Vico put it) of Amerindian arts of memory, whose logical universe this article has endeavored to outline.

It is obvious that there remains a great deal of work to be done teasing out and resolving these exchanges between mnemonic iconography and linguistic signs, as well as exploring oral and iconographic traditions and their links to mathematical calculations and numerical series. Let me just say that the theoretical and methodological perspective proper to the anthropology of memory (understood as the study of certain techniques of thought) in no way excludes the parallel study of the trajectories taken by alphabetic writing when it is introduced into predominantly "oral" cultures. Such a study would clear a path for the analysis of the uses of writing within "oral" traditions and, therefore, within a mental space characterized by the use of "mental artifacts" proper to the non-Western arts of memory. This might, at long last, be a means of freeing ourselves (through empirical research) from the anthropological myth of an original Ur-language, composed of emblems and symbolic images, which Vico, as late as 1744, still saw as the conceptual underpinning "of all hieroglyphics."

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Les arts de la mémoire : anthropologie comparative d'un artefact mental

Résumé : Pour linguistes, anthropologues et archéologues, l'image emblématique précède, depuis toujours et partout, l'apparition du signe. Ce mythe d'une langue figurée, composée d'icônes, qui constitue la *figure adverse* de l'écriture, a profondément influencé la tradition occidentale. Dans cet article, on essaiera de montrer que nous ne pourrons comprendre la nature logique des mnémotechnies amérindiennes (pictographies, *khipus*) qu'en passant de l'interrogation, inévitablement ethnocentrique, que soulève leur comparaison avec l'écriture, à un

tout autre ordre de questions, qui relèvent de l'anthropologie comparative. Par conséquent, nous ne chercherons pas à savoir si les techniques amérindiennes de mémorisation sont de « véritables » écritures, ou seulement des mnémotechnies. Nous nous demanderons plutôt si ces symbolismes, en tant qu'ensembles graphiques organisés à usage mnémonique, possèdent des traits formels en commun et s'ils impliquent des opérations mentales comparables. Nous chercherons ainsi à établir si ces systèmes appartiennent à un même univers conceptuel, à une *langue mentale*—pour reprendre une idée de Giambattista Vico—qui caractériserait les arts amérindiens de la mémoire. Si l'on suit cette perspective, les techniques de la mémoire cessent de nous sembler hybrides ou imprécises, et que nous pourrons mieux en comprendre la nature et les fonctions, en tant qu'artefacts mentaux.

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